



SPEC CPU®2017 Integer Speed Result

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xFusion

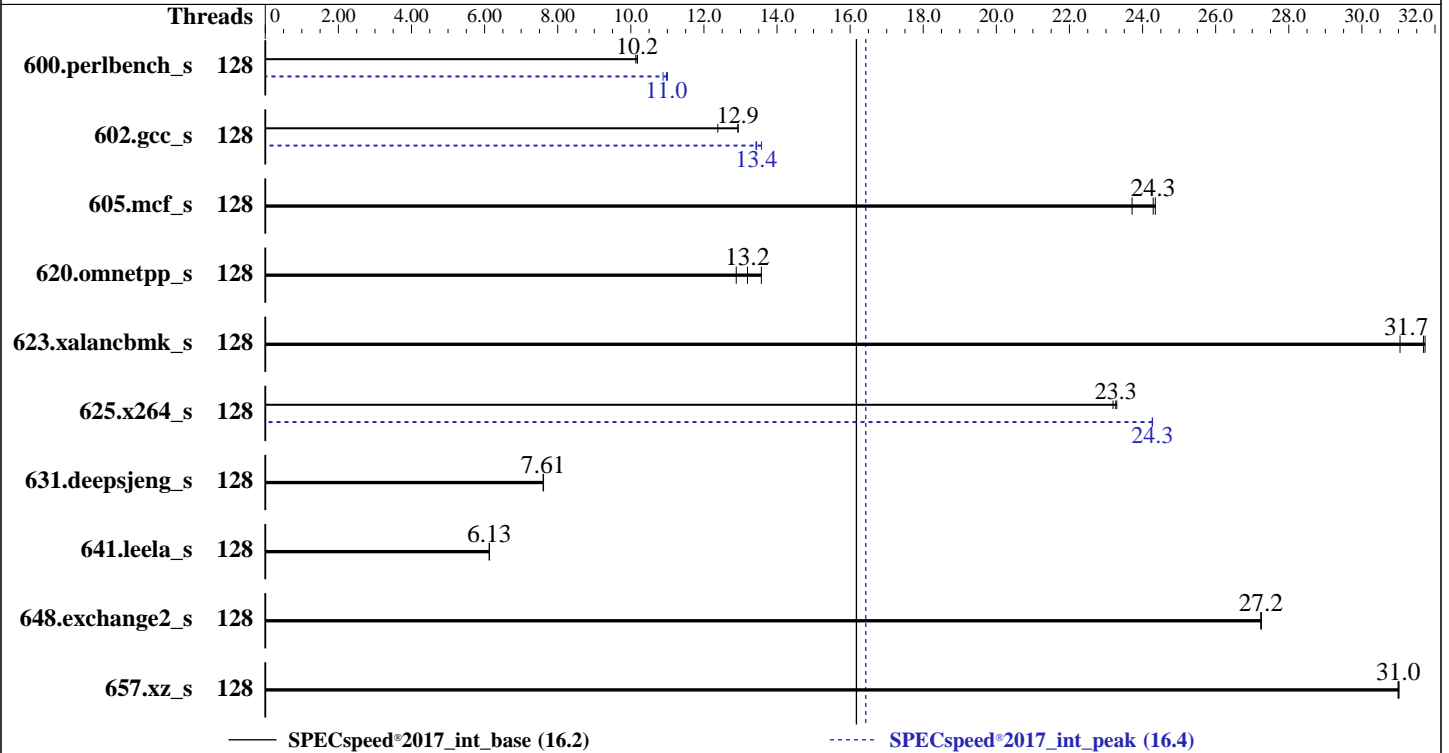
SPECspeed®2017_int_base = 16.2

FusionServer 5885H V7 (Intel Xeon Gold 6448H)

SPECspeed®2017_int_peak = 16.4

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

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



Hardware

CPU Name: Intel Xeon Gold 6448H
Max MHz: 4100
Nominal: 2400
Enabled: 128 cores, 4 chips
Orderable: 1,2,4 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 60 MB I+D on chip per chip
Other: None
Memory: 1 TB (32 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 960 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 2023.0 of Intel oneAPI DPC++/C++
Compiler for Linux;
Fortran: Version 2023.0 of Intel Fortran Compiler
for Linux;
Parallel: Yes
Firmware: Version 01.02.00.05 Released Jul-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 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
600.perlbench_s	128	175	10.1	174	10.2	174	10.2	128	163	10.9	161	11.0	162	11.0
602.gcc_s	128	308	12.9	322	12.4	308	12.9	128	293	13.6	297	13.4	296	13.4
605.mcf_s	128	199	23.7	194	24.3	194	24.3	128	199	23.7	194	24.3	194	24.3
620.omnetpp_s	128	127	12.9	124	13.2	120	13.6	128	127	12.9	124	13.2	120	13.6
623.xalancbmk_s	128	45.6	31.0	44.7	31.7	44.7	31.7	128	45.6	31.0	44.7	31.7	44.7	31.7
625.x264_s	128	76.1	23.2	75.7	23.3	75.8	23.3	128	72.7	24.3	72.7	24.3	72.7	24.3
631.deepsjeng_s	128	188	7.60	188	7.61	188	7.61	128	188	7.60	188	7.61	188	7.61
641.leela_s	128	278	6.13	278	6.13	278	6.13	128	278	6.13	278	6.13	278	6.13
648.exchange2_s	128	108	27.2	108	27.2	108	27.2	128	108	27.2	108	27.2	108	27.2
657.xz_s	128	199	31.0	199	31.0	199	31.0	128	199	31.0	199	31.0	199	31.0

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

Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

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,scatter"
LD_LIBRARY_PATH = "/home/Uniautos/cpu2017/lib/intel64:/home/Uniautos/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 Red Hat Enterprise Linux 8.4
Transparent Huge Pages enabled by default
Prior to runcpu invocation

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General Notes (Continued)

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>

Platform Notes

BIOS configuration:
Performance Profile Set to Load Balance
Enable LP [Global] Set to Single LP

Sysinfo program /home/Uniautos/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Tue Sep 5 15:04:26 2023

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

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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

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Platform Notes (Continued)

2. w
15:04:26 up 4:31, 1 user, load average: 0.01, 0.01, 0.00
USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root pts/0 14:52 10.00s 0.75s 0.05s -bash

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) 4125248
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) 4125248
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited

5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@pts/0
-bash
/bin/sh ./run_speed.sh
runcpu --define default-platform-flags -c ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=128 --tune base,peak -o all --define intspeerdaaffinity --define drop_caches intspeed
runcpu --define default-platform-flags --configfile ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=128 --tune base,peak --output_format all --define intspeerdaaffinity --define drop_caches --nopower --runmode speed --tune base:peak --size refspeerda intspeed --nopreenv --note-preenv --logfile \$SPEC/tmp/CPU2017.085/templogs/preenv.intspeed.085.0.log --lognum 085.0 --from_runcpu 2
specperl \$SPEC/bin/sysinfo
\$SPEC = /home/Uniautos/cpu2017

6. /proc/cpuinfo
model name : Intel(R) Xeon(R) Gold 6448H
vendor_id : GenuineIntel
cpu family : 6
model : 143
stepping : 8
microcode : 0x2b0001b0
bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores : 32
siblings : 32
4 physical ids (chips)
128 processors (hardware threads)
physical id 0: core ids 0-31

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Platform Notes (Continued)

```

physical id 1: core ids 0-31
physical id 2: core ids 0-31
physical id 3: 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, 180, 182, 184, 186, 188, 190
physical id 2: apicids
256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318
physical id 3: apicids
384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446

```

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
CPU(s):                 128
On-line CPU(s) list:   0-127
Vendor ID:              GenuineIntel
BIOS Vendor ID:        Intel(R) Corporation
Model name:             Intel(R) Xeon(R) Gold 6448H
BIOS Model name:       Intel(R) Xeon(R) Gold 6448H
CPU family:             6
Model:                  143
Thread(s) per core:    1
Core(s) per socket:    32
Socket(s):              4
Stepping:               8
Frequency boost:        enabled
CPU max MHz:           2401.0000
CPU min MHz:           800.0000
BogoMIPS:               4800.00
Flags:                  fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                        clflush dts acpi mmx fxsr 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 bmil 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 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 avx512_fp16 amx_tile flush_l1d arch_capabilities
Virtualization:        VT-x
Lld cache:             6 MiB (128 instances)

```

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Platform Notes (Continued)

```

L1i cache:          4 MiB (128 instances)
L2 cache:          256 MiB (128 instances)
L3 cache:          240 MiB (4 instances)
NUMA node(s):      4
NUMA node0 CPU(s): 0-31
NUMA node1 CPU(s): 32-63
NUMA node2 CPU(s): 64-95
NUMA node3 CPU(s): 96-127
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 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	6M	12	Data	1	64	1	64
L1i	32K	4M	8	Instruction	1	64	1	64
L2	2M	256M	16	Unified	2	2048	1	64
L3	60M	240M	15	Unified	3	65536	1	64

8. numactl --hardware

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

```

available: 4 nodes (0-3)
node 0 cpus: 0-31
node 0 size: 257237 MB
node 0 free: 256163 MB
node 1 cpus: 32-63
node 1 size: 258041 MB
node 1 free: 257271 MB
node 2 cpus: 64-95
node 2 size: 258041 MB
node 2 free: 257214 MB
node 3 cpus: 96-127
node 3 size: 258030 MB
node 3 free: 255752 MB
node distances:
node  0  1  2  3
0:  10  21  21  21
1:  21  10  21  21
2:  21  21  10  21
3:  21  21  21  10

```

9. /proc/meminfo

MemTotal: 1056101732 kB

10. who -r

run-level 3 Sep 5 10:33

11. Systemd service manager version: systemd 250 (250-6.e19_0)

```

Default Target Status
multi-user      degraded

```

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Platform Notes (Continued)

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@ irqbalance kdump mdmonitor microcode nis-domainname rhsmcertd
           rsyslog selinux-autorelabel-mark sep5 sshd sssd systemd-network-generator tuned udisks2

enabled-runtime
disabled   systemd-remount-fs
           chrony-wait console-getty cpupower debug-shell kvm_stat man-db-restart-cache-update
           nftables rdisc rhsm rhsm-facts rpmdb-rebuild serial-getty@ sshd-keygen@
           systemd-boot-check-no-failures systemd-pstore systemd-sysext

indirect   sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
```

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=UUID=058bfd1-c62b-4fad-8d41-5c40aa179007
ro
crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
resume=UUID=b47f1685-a5fa-4d39-b2d7-e3f6e95ad499
nohz_full=1-72
```

15. `cpupower frequency-info`

```
analyzing CPU 0:
  current policy: frequency should be within 800 MHz and 2.40 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
```

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Platform Notes (Continued)

```
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 9.0 (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/Uniautos/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda5       xfs   820G  49G  772G  6% /home
-----
```

```
-----
22. /sys/devices/virtual/dmi/id
Vendor:          XFUSION
Product:         5885H V7
Product Family: EagleStream
-----
```

```
-----
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:
  32x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800
-----
```

```
-----
24. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:      XFUSION
BIOS Version:     01.02.00.05
BIOS Date:        07/13/2023
-----
```




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Compiler Version Notes

C | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak)
657.xz_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++ | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak)
641.leela_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.

Fortran | 648.exchange2_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.

Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64



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Base Optimization Flags

C benchmarks:

```
-m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:

```
-m64 -std=c++14 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:

```
-m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Peak Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profddata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-fiopenmp -DSPEC_OPENMP -fno-strict-overflow
```

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

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xFusion

SPECspeed®2017_int_base = 16.2

FusionServer 5885H V7 (Intel Xeon Gold 6448H)

SPECspeed®2017_int_peak = 16.4

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

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

Peak Optimization Flags (Continued)

600.perlbench_s (continued):

```
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)

```
-fprofile-use=default.profddata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-fiopenmp -DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc
```

605.mcf_s: basepeak = yes

625.x264_s: -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -O3

```
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-fno-alias -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_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-SPR-V1.1-revC.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-SPR-V1.1-revC.xml>



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