



SPEC CPU®2017 Integer Speed Result

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xFusion

SPECspeed®2017_int_base = 11.2

FusionServer 2288H V6 (Intel Xeon Gold 6330)

SPECspeed®2017_int_peak = 11.4

CPU2017 License: 6488

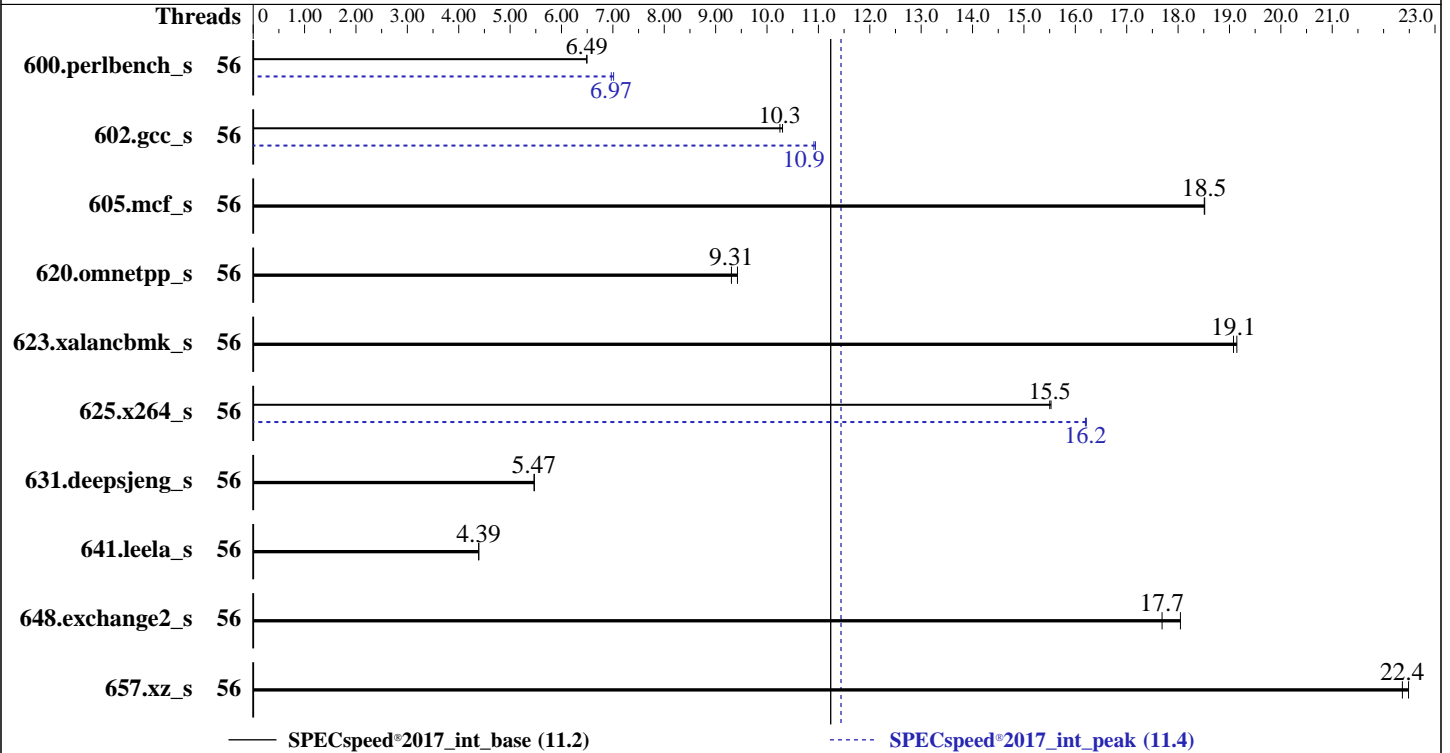
Test Sponsor: xFusion

Tested by: xFusion

Test Date: Jul-2023

Hardware Availability: Apr-2021

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Gold 6330
 Max MHz: 3100
 Nominal: 2000
 Enabled: 56 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: 42 MB I+D on chip per chip
 Other: None
 Memory: 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)
 Storage: 1 x 1920 GB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux release 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: 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	56	273	6.50	<u>273</u>	<u>6.49</u>			56	<u>255</u>	<u>6.97</u>	253	7.01		
602.gcc_s	56	387	10.3	<u>388</u>	<u>10.3</u>			56	<u>365</u>	<u>10.9</u>	364	10.9		
605.mcf_s	56	<u>255</u>	<u>18.5</u>	255	18.5			56	<u>255</u>	<u>18.5</u>	255	18.5		
620.omnetpp_s	56	173	9.42	<u>175</u>	<u>9.31</u>			56	173	9.42	<u>175</u>	<u>9.31</u>		
623.xalancbmk_s	56	74.0	19.1	<u>74.3</u>	<u>19.1</u>			56	74.0	19.1	<u>74.3</u>	<u>19.1</u>		
625.x264_s	56	<u>114</u>	<u>15.5</u>	114	15.5			56	<u>109</u>	<u>16.2</u>	109	16.2		
631.deepsjeng_s	56	262	5.47	<u>262</u>	<u>5.47</u>			56	262	5.47	<u>262</u>	<u>5.47</u>		
641.leela_s	56	389	4.39	<u>389</u>	<u>4.39</u>			56	389	4.39	<u>389</u>	<u>4.39</u>		
648.exchange2_s	56	163	18.0	<u>166</u>	<u>17.7</u>			56	163	18.0	<u>166</u>	<u>17.7</u>		
657.xz_s	56	<u>276</u>	<u>22.4</u>	275	22.5			56	<u>276</u>	<u>22.4</u>	275	22.5		

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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,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 Red Hat Enterprise Linux 8.4
Transparent Huge Pages enabled by default
Prior to runcpu invocation

(Continued on next page)



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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
Hyper-Threading Set to Disabled

Sysinfo program /spec2017-icc2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Mon Jul 31 14:05:45 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
-

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Platform Notes (Continued)

```
2. w
   14:05:45 up 0 min,  1 user,  load average: 2.97, 1.04, 0.37
USER  TTY      FROM             LOGIN@   IDLE   JCPU   PCPU   WHAT
root  tty1      -                14:05   9.00s  1.23s  0.00s  -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
   pending signals         (-i) 2060583
   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) 2060583
   virtual memory          (kbytes, -v) unlimited
   file locks              (-x) unlimited
```

```
-----
5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 18
   login -- root
   -bash
   -bash
   runcpu --define default-platform-flags -c ic2023.0-lin-core-avx512-speed-20221201.cfg --define cores=56
   --tune base,peak --iterations 2 -o all --define intspeedaffinity --define drop_caches intspeed
   runcpu --define default-platform-flags --configfile ic2023.0-lin-core-avx512-speed-20221201.cfg --define
   cores=56 --tune base,peak --iterations 2 --output_format all --define intspeedaffinity --define
   drop_caches --nopower --runmode speed --tune base:peak --size refspeed intspeed --nopreenv --note-preenv
   --logfile $SPEC/tmp/CPU2017.082/temlogs/preenv.intspeed.082.0.log --lognum 082.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /spec2017-icc2023.0
```

```
-----
6. /proc/cpuinfo
   model name      : Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
   vendor_id      : GenuineIntel
   cpu family     : 6
   model          : 106
   stepping       : 6
   microcode      : 0xd000363
   bugs           : spectre_v1 spectre_v2 spec_store_bypass swaps
   cpu cores      : 28
   siblings       : 28
   2 physical ids (chips)
   56 processors (hardware threads)
   physical id 0: core ids 0-27
   physical id 1: core ids 0-27
   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
   physical id 1: apicids
```

(Continued on next page)



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Platform Notes (Continued)

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

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):                 56
On-line CPU(s) list:   0-55
Thread(s) per core:    1
Core(s) per socket:    28
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 6330 CPU @ 2.00GHz
BIOS Model name:        Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
Stepping:               6
CPU MHz:                800.955
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:               43008K
NUMA node0 CPU(s):     0-27
NUMA node1 CPU(s):     28-55
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: 0-27
node 0 size: 257180 MB
node 0 free: 256481 MB
node 1 cpus: 28-55
node 1 size: 258002 MB
node 1 free: 257092 MB

```

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Platform Notes (Continued)

node distances:

```
node    0    1
0:     10   20
1:     20   10
```

9. /proc/meminfo
MemTotal: 527546904 kB

10. who -r
run-level 3 Jul 31 14:05

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 iscsiuiop kpatch kvm_stat ledmon nftables nvme-fc-autoconnect oddjobd psacct rdisc rhcd rhsm rhsm-facts serial-getty@ sshd-keygen@ systemd-resolved tcsh
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.

16. sysctl

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Platform Notes (Continued)

```

kernel.numa_balancing          1
kernel.randomize_va_space     2
vm.compaction_proactiveness   0
vm.dirty_background_bytes     0
vm.dirty_background_ratio     10
vm.dirty_bytes                0
vm.dirty_expire_centisecs     3000
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
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+madvice [madvice] never
enabled         [always] madvice 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/swapgs 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

```

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Platform Notes (Continued)

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda3	xfs	420G	31G	390G	8%	/

```

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
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, configured at 2933

```

```

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          | 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.



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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
```

Base Optimization Flags

C benchmarks:

```
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -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 -xCORE-AVX512 -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 -xCORE-AVX512 -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
```



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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.profdata(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
-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.profdata(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 -xCORE-AVX512 -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:

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

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xFusion

SPECspeed®2017_int_base = 11.2

FusionServer 2288H V6 (Intel Xeon Gold 6330)

SPECspeed®2017_int_peak = 11.4

CPU2017 License: 6488

Test Sponsor: xFusion

Tested by: xFusion

Test Date: Jul-2023

Hardware Availability: Apr-2021

Software Availability: Dec-2022

Peak Optimization Flags (Continued)

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-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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